Forensic Science International 208 (2011) e6–e9

Contents lists available at ScienceDirect

Forensic Science International

journal homepage: www.elsevier.com/locate/forsciint

Case report

Case report: Forensic anthropological assessment in a suspected case of child abuse from South Africa

M. Steyn *

Forensic Anthropology Research Centre, Department of Anatomy, University of Pretoria, P.O. Box 2034, Pretoria 0001, South Africa

ARTICLE INFO

Article history:
Received 5 August 2010
Received in revised form 17 January 2011
Accepted 19 January 2011
Available online 12 February 2011

Keywords:
Child abuse
Cranial base fracture
Petrosal fracture
Forensic osteology

ABSTRACT

Not many case reports of suspected child abuse as assessed solely on skeletal remains are available. Forensic anthropologists have intimate knowledge of normal skeletal anatomy, bone trauma and processes of healing of bone and may therefore be of help in suspected cases of child abuse. Patterns of trauma in juvenile skeletal remains which are suggestive of abuse include fractures in different phases of healing, multiple fractures, typical fractures on ribs and long bones and severe, complicated cranial fractures. The aim of this paper is to report on the findings of the analysis of the skeletal remains of a 3.5 years old boy. Forensic pathological examination indicated that the boy had died from a massive cranial fracture, with multiple injuries present to the rest of the body. After the body had been buried for some time, it was exhumed and we were requested to look for signs of chronic, long-term abuse. Findings included a massive cranial fracture, another fracture in the roof of the orbit, two areas of non-specific subperiosteal bone growth and several untreated carious teeth. No clear healed fracture could be found, except for a possible healed cranial base fracture which stretched transversely across the petrosal bone. This area showed signs of recent bone activity. The court decided that this was not enough evidence of chronic abuse and found the accused guilty of murder but not of chronic child abuse. This case illustrates the difficulty to obtain clear signs of chronic injury on juvenile remains.

1. Introduction

Child abuse occurs when the physical or mental health and welfare of a child are harmed. According to the World Health Organization, this includes all forms of physical and emotional ill-treatment, sexual abuse, neglect and exploitation [1]. These cases are not often referred to forensic anthropologists, as the deceased children are usually assessed by forensic medical examiners alone, and evaluation of soft tissues is frequently adequate. However, there are some specific circumstances where the expertise of a forensic anthropologist can make a valuable contribution [2]. Generally, however, published case reports focusing solely on the analysis of skeletal remains in child abuse are rare.

When assessing a child for signs of child abuse, it is necessary to look for evidence of chronic, patterned injuries. Fractures are often in various stages of healing, with healing sometimes disrupted by repeated incidents of abuse (e.g. [2–5]). Post-cranially, fractures sustained due to child abuse most commonly occur in the rib cage [6,7], but they can also be found in any of the long bones. These long bone fractures often present as spiral fractures due to twisting of, for example, an arm, "bucket handle" fractures of the metaphysis, green stick fractures or injuries involving the epiphyseal plate. A comprehensive up-to-date review of the available literature on long bone fractures in child abuse can be found in Kemp et al. [6] and Bilo et al. [5]. Because children's bones are more pliable and soft tissues such as the periosteum are stronger than those of adults, dislocations, displaced fractures and complete fractures are less commonly seen.

Cranial fractures sustained in cases of child abuse also have a number of specific characteristics, but it can be very difficult to distinguish fractures resulting from accidents from those due to child abuse. According to Wood et al. [8], between 17 and 33% of infants and children admitted to hospital with head injuries are victims of child abuse. Simple linear fractures, often in the parietal bone, occur most commonly but they are also frequently seen in accidental trauma. Complex or multiple fractures, fractures crossing sutures as well as depressed fractures are suggestive of externally applied force such as may be the case in physical abuse [5,6,8,9].

Walker et al. [2] discussed the results of skeletal analysis of four children where child abuse was suspected. They found that skeletal injuries in these cases have a number of distinctive characteristics, which include multiple localized areas of asymmetrically distributed subperiosteal bone growth in different phases of healing. These lesions may be either the result of stripping of the periosteum of the bone as a limb is used as a handle to punish

* Tel.: +27 12 4203256; fax: +27 12 3192240.
E-mail address: maryna.steyn@up.ac.za.

0379-0738/$ – see front matter © 2011 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.forsciint.2011.01.023

the child, or the result of direct hitting, e.g., with an object held in the hand of the abuser. Stunting of growth [10–13] and poor dental care are also common findings.

The features described above can usually be observed on skeletal remains even in the absence of soft tissues, thus implicating that an experienced forensic osteologist can contribute to identifying signs of suspected abuse. However, the very fast healing rates of children and infants as well as poor preservation of skeletal material often found where juvenile remains are concerned may confound matters [2].

It is difficult to get statistics relating specifically to child abuse in South Africa. Nearly 200 pre-school (6 years and younger) violent child deaths were reported for 2008/2009, but it is not stated which proportion of these are related to abuse. "Neglect and ill-treatment of children" younger than 18 years are reported as occurring in 8.3 per 100,000 of the population, but once again quoted figures are very non-specific [14].

The aim of this paper is to report on the skeletal findings in a case of a murdered child where long-term child abuse was suspected. An attempt was made to look for signs of repeated, patterned physical abuse, but some difficulties were experienced which will be discussed.

2. Case history

A 3 and a half-year old boy died in 2004 in the Gauteng Province of South Africa, as a result of several massive injuries, among them a cranial fracture. The child was in the care of his step-father when he died, and inconsistent accounts of the events surrounding his death were given as is typically the case in battered children. It was said that the boy had earlier fallen in the bath, and injured himself. The step-father claimed that the boy later suffered an epileptic fit (although he was not a known epileptic), and that he had hit the floor with his head first. He died before medical help could be obtained.

According to eye witnesses who arrived at the scene of the crime some time after the event, the boy's room smelled of blood, there were blood spatters everywhere and his mattress and pillow were wet as someone had apparently tried to clean it of blood. The room itself was only investigated by forensic scientists at a much later stage after everything was completely cleaned.

At autopsy it was found that the child had several bruises and lacerations, a blue eye (right) and abdominal injuries. He also had a massive cranial fracture. No X-rays were taken at the time, and the child was buried shortly after the autopsy was done. He weighed 10 kg at the time of death.

About a year later the prosecutor dealing with this case decided to have the body exhumed, in order to have the remains assessed for signs of chronic abuse. The aim of this was to obtain evidence that would allow her to not only charge the step-father with murder, but to also look for evidence of a prolonged period of repeated abuse. Both the step-father and the biological mother, who was not at home when the child had died, were accused of child neglect, ill-treatment of a child and murder.

3. Results

The remains submitted for forensic anthropological assessment comprised of an almost complete skeleton of a juvenile individual. Some soft tissues were present, which were removed before analysis. The skull was in several pieces, and needed reconstruction. Due to plastic deformation resulting from the blunt force injuries sustained, the reconstruction could not be perfectly executed. The skull was opened, indicating that a post mortem examination had been done before.

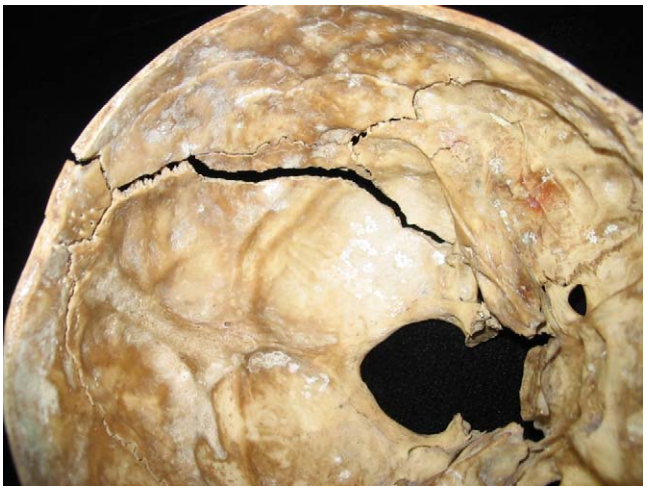

Fig. 1. Close-up view of the cranial fracture that was the probable cause of death. Superior view of opened skull.

No attempt was made to determine the sex of this individual, due to its young age. The full set of deciduous teeth had erupted and was in occlusion but none of the permanent teeth had erupted, as would be expected in a child of this age. Dental eruption was not delayed relative to the age of the child.

When analyzing the cranial remains, two unhealed, peri-mortem fractures were clearly visible. The most obvious of these fractures, which was also most probably related to the cause of death, was a massive fracture on the left side of the skull (Fig. 1). This fracture originated from the skull base, in the occipital bone, and stretched through the occipital bone and the left parieto-occipital suture into the left parietal bone (Fig. 2). Widening of several of the cranial sutures was visible, for example the right parieto-occipital suture. The second fracture was present in the roof of the right orbit, which is consistent with the evidence of the pathologist that the child had a blue eye on the right side (Fig. 2). This fracture was not picked up at autopsy, but it should be kept in mind that the skull of a small child is very delicate therefore making it susceptible to fractures caused by, for example, a craniotomy or post-mortem handling. The tooth socket of the right lower lateral incisor was also fractured.

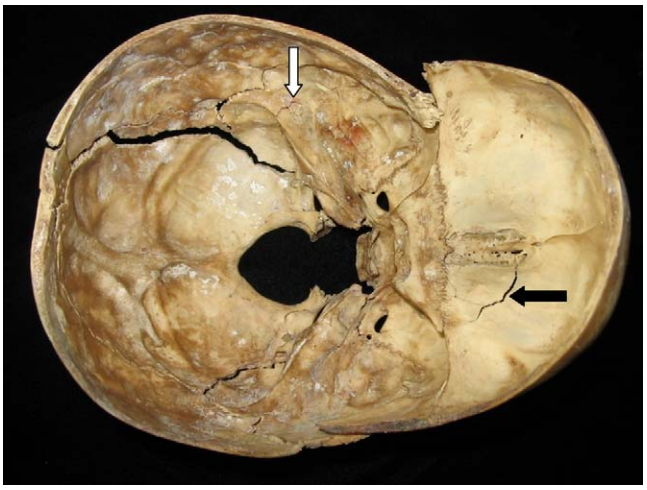

Fig. 2. The opened skull from above. The large fracture of the left parieto-occipital area is clearly visible. The white arrow indicates the defect in the petrosal bone. Note also the fracture of the roof of the right orbit (black arrow). The skull is somewhat distorted due to plastic deformation.